

EXAMINER INTERVIEW SUMMARY AND AMENDMENT AND RESPONSE UNDER 37 CFR § 1.116

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Serial No.: 10/807,214

Filed: March 22, 2004

Title: METHOD AND APPARATUS FOR INTEGRATED BATTERY-CAPACITOR DEVICES

In the Claims

Please amend the claims as follows:

1 – 20. (Cancelled)

21. (Currently amended) A method for making a combined battery and device apparatus, the method comprising:

providing a substrate; and

successively depositing a plurality of thin-film layers successively on the substrate, the plurality of successively deposited layers forming a solid-state battery and a capacitor electrically connected to one another, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material.

22. (Original) The method of claim 21, wherein the providing of the substrate includes providing the substrate that already includes the thin-film solid-state battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material; and wherein the depositing of the plurality of layers includes depositing one or more layers to form the thin-film capacitor on a surface of the battery.

23. (Original) The method of claim 21, wherein the providing of the substrate includes providing the substrate that already includes one or more layers of the thin-film capacitor, and wherein the depositing of the plurality of layers includes depositing one or more layers to form the thin-film solid-state battery on a surface of the substrate including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material.

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24. (Original) The method of claim 21, further comprising:
attaching an integrated circuit to the combined battery and device apparatus; and
electrically coupling the integrated circuit to the battery and to the capacitor.
25. (Original) The method of claim 21, further comprising:
mounting an integrated circuit on the capacitor; and
electrically connecting the integrated circuit to the battery and the capacitor.
26. (Original) The method of claim 21, further comprising:
depositing an insulating layer on the combined battery and capacitor; and
depositing a plurality of electrical traces on the insulating layer, wherein at least one of the plurality of electrical traces contacts an electrode of the battery through the insulating layer.
27. (Original) The method of claim 21, further comprising:
depositing an insulating layer on the battery and the capacitor;
forming a plurality of electrical traces on the insulating layer;
supporting an integrated circuit on the battery and the capacitor;
electrically connecting a first one of the plurality of electrical traces to the cathode of the battery and the integrated circuit; and
electrically connecting a second one of the plurality of electrical traces to the anode of the battery and the integrated circuit.
28. (Currently amended) A method for making a combined battery and device apparatus, the method comprising:
providing a thin-film solid-state battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material; and
successively depositing one or more a plurality of thin-film layers to form a thin-film capacitor on a surface of the battery.

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29. (Currently amended) A method for making a combined battery and device apparatus, the method comprising:

providing a thin-film capacitor; and

successively depositing one or more a plurality of thin-film layers to form a thin-film solid-state battery on a surface of the capacitor, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material.

30. (Currently amended) A method for making a combined battery and device apparatus, the method comprising:

providing a substrate having a major surface area;

depositing a first conductive layer on a first surface area of the substrate's major surface area;

successively depositing onto the first conductive layer a plurality of thin-film layers to form a battery including that includes a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material, the battery disposed such that either the cathode layer or the anode layer is in electrical contact with the first conductive layer; and

depositing an electrical circuit on the battery, wherein the electrical circuit includes a thin-film capacitor successively deposited as a plurality of thin-film layers on a surface of the substrate beside the battery.

31. (Original) The method of claim 21, wherein the substrate includes an integrated circuit having an insulating layer on the integrated circuit, the insulating layer including a plurality of through vias, the method further comprising:

electrically connecting the cathode of the battery to the integrated circuit though a first one of plurality of through vias; and

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electrically connecting the anode of the battery to the integrated circuit though a second one of plurality of through vias.

32. (Previously presented) A method for making a combined battery and device apparatus, the method comprising:

providing a substrate; and

depositing a plurality of thin-film layers on the substrate, the plurality of layers forming a solid-state battery and a capacitor electrically connected to one another, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material,

wherein the substrate includes an integrated circuit, the method further comprising:

depositing an insulating layer over the integrated circuit, the insulating layer including a plurality of through vias;

depositing a cathode-conductor of the battery on the insulating layer;

electrically connecting the cathode-conductor of the battery to the integrated circuit though a first one of plurality of through vias;

depositing the cathode layer of the battery on the cathode conductor;

depositing the electrolyte layer on the cathode layer;

depositing the anode on the electrolyte layer; and

electrically connecting the anode to the integrated circuit though a second one of plurality of through vias.

33. (Currently amended) A method for making a combined battery and device apparatus, the method comprising:

providing a substrate; and

successively depositing a plurality of thin-film layers on the substrate, the plurality of layers forming a solid-state battery and a capacitor electrically connected to one another, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and

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electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material,

wherein the substrate includes an integrated circuit, ~~the method and wherein the~~
~~successively depositing of the plurality of thin-film layers further comprising includes:~~
depositing an insulating layer on the integrated circuit, the insulating layer including a plurality of through vias;

depositing a cathode-conductor of the battery on a face of the integrated circuit opposite the insulating layer;

electrically connecting the cathode-conductor of the battery to the integrated circuit though a first one of plurality of through vias;

depositing the cathode layer of the battery on the cathode conductor;

depositing the electrolyte layer on the cathode layer;

depositing the anode on the electrolyte layer; and

electrically connecting the anode to the integrated circuit though a second one of plurality of through vias.

34. (Previously presented) A method for making a combined battery and device apparatus, the method comprising:

providing a substrate; and

depositing a plurality of thin-film layers on the substrate, the plurality of layers forming a solid-state battery and a capacitor electrically connected to one another, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material, further comprising:

depositing an insulating layer on the battery that acts as a passivation layer that protects the anode from environmental corrosion; and

depositing a conductive layer to form the capacitor and a plurality of electrical traces on the insulating layer, wherein at least one of the plurality of electrical traces contacts an electrode of the battery through the insulating layer.

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35. (Original) The method of claim 21, further comprising:
forming the substrate into a curved shape having a convex face and a concave face; and
locating the battery and the capacitor on the concave face.

36. (Original) The method of claim 21, wherein the substrate comprises a polymer having a melting point substantially below 700 degrees centigrade, and the method includes avoiding melting the substrate.

37. (Currently amended) A method for making a combined battery and device apparatus, the method comprising:

providing a thin-film solid-state battery on a substrate, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material; and

successively depositing one or more a plurality of thin-film layers of a thin-film capacitor on the substrate beside the battery.

38. (Previously presented) A method for making a combined battery and device apparatus, the method comprising:

providing a thin-film solid-state battery on a substrate, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material; and

depositing one or more layers of a thin-film capacitor on the substrate beside the battery, further comprising:

attaching an integrated circuit to the combined battery and device apparatus; and
electrically coupling the integrated circuit to the battery and to the capacitor.

39. (Previously presented) A method for making a combined battery and device apparatus, the

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method comprising:

providing a thin-film solid-state battery on a substrate, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material; and

depositing one or more layers of a thin-film capacitor on the substrate beside the battery;
mounting an integrated circuit on the capacitor; and
electrically connecting the integrated circuit to the battery and the capacitor.

40. (Previously presented) A method for making a combined battery and device apparatus, the method comprising:

providing a thin-film solid-state battery on a substrate, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material; and

depositing one or more layers of a thin-film capacitor on the substrate beside the battery
further comprising:

depositing an insulating layer on the battery and the capacitor; and

depositing a plurality of electrical traces on the insulating layer, wherein at least one of the plurality of electrical traces contacts an electrode of the battery through the insulating layer.

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41. (Previously presented) A method for making a combined battery and device apparatus, the method comprising:

providing a thin-film solid-state battery on a substrate, the battery including a cathode layer; an anode layer, and an electrolyte layer located between and electrically isolating the anode layer from the cathode layer, wherein the anode or the cathode or both include an intercalation material; and

depositing one or more layers of a thin-film capacitor on the substrate beside the battery, further comprising:

depositing an insulating layer on the battery and the capacitor;

forming a plurality of electrical traces on the insulating layer;

supporting an integrated circuit on the battery and the capacitor;

electrically connecting a first one of the plurality of electrical traces to the cathode of the battery and the integrated circuit; and

electrically connecting a second one of the plurality of electrical traces to the anode of the battery and the integrated circuit.

42 - 54. (Cancelled)

55. (Previously presented) The method of claim 21, wherein the substrate comprises a polymer having a melting point substantially below 700 degrees centigrade.

56. (Previously presented) The method of claim 21, wherein the substrate comprises a metal foil.

57. (Previously presented) The method of claim 21, wherein the substrate comprises a metal foil having an insulative layer between the metal foil and the first conductive layer adjacent to a first surface area of the substrate's major surface area.

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58. (Previously presented) The method of claim 21, wherein the substrate comprises a ceramic.

59. (Previously presented) The method of claim 21, wherein the substrate comprises a glass.

60. (Currently Amended) The method of claim 21, further comprising shaping the substrate to a shape having a convex face and a concave face, and having the battery located on the concave face-face.

61. (Previously presented) The method of claim 30, wherein the substrate has a curved shape having a convex face and a concave face, and the battery is located on the concave face.

62. (Previously presented) The method of claim 37, further comprising shaping the substrate to a shape having a convex face and a concave face, and having the battery located on the concave face.